

Claim 27. The edible formulation of Claim 23, wherein the edible formulation comprises baked goods; puddings, creams and custards; jams and jellies; confections; soft drinks and other sweetened beverages, in liquid or dry form; sauces and salad dressings; ice cream and frozen desserts; foods which are sweetened; and pharmaceuticals.

Claim 28. The edible formulation of Claim 27, wherein the formulation further comprises aspartame or its salts or metal complexes, acesulfame-K, alitame, trichlorogalactosucrose, cyclamates, saccharin, fructose, neohesperidine, or mixtures thereof.

REMARKS

Restriction Requirement

Claims to a non-elected invention (Claims 12-18) have been canceled by amendment herein. Claims to non-elected species (Claims 9 and 10) have also been canceled.

Section 112 Rejection

In response to the Examiner's rejection of all elected claims (Claims 1-8, 11 and 19-26) under 35 U.S.C. Section 112, second paragraph, as being indefinite, Applicants' have amended Claims 1, 21 and 26, canceled Claims 19 and 20 and added new claims 27 and 28 to distinctly claim the subject matter of the invention. These amendments provide proper antecedent basis in dependent claims and clarify the subject matter of each claim.

New Claims 27 and 28 replace cancelled Claims 19 and 20. Cancelled Claims 19 and 20 were replaced to clarify the antecedent basis for the edible formulations.

Claim 1 has been amended to clarify that the original preamble limitation (for use in edible formulations) is actually a character limitation of the invention. Notwithstanding the Examiner's comments regarding a lack of distinction between Claims 1 and 5, Claim 5 presents a distinct, more narrow scope of heteropolysaccharides (a DP of 3 to 30 versus 3 to 75). The same comment applies to Claims 21 and 22.

Rejections Under Section 102/Section 103

It is unclear from the Examiner's comments whether the rejection is a Section 102 novelty rejection or a Section 103 obviousness rejection. Assuming that the Examiner intended two rejections, one under each section, Applicants will address each section separately.

With respect to Section 102, Claims 1-8, 11, 21 and 22-28 do not read on the claims or specification of any reference cited by the Examiner herein. Applicants' claims are directed to bulking agents having the following limiting

characteristics:

Soluble
Substantially depolymerized (DP of 3 to 75)
Heteropolysaccharide(s)
Naturally-occurring AND
Hexose backbone.

May
1991

Applicants' edible formulations are limited to those comprising, as bulking agents, the following materials:

Substantially non-digestible
Depolymerized heteropolysaccharide(s)
Average molecular weight 500 to 50,000 AND
The heteropolysaccharide(s) must be naturally-occurring food gum having hexose backbones.

In contrast, the Hill reference discloses guar gum which is treated to remove its "snot-like" character and, at the same time, to provide a sterilized gum having benefits in commercial use (column 9, lines 1-13). In Example 11, columns 19 and 20 of Hill, it is disclosed that the viscosity of the guar gum is "not greatly reduced" by the depolymerization treatment. Further evidence of the high viscosity of the Hill guar gum product is provided in Examples 1 and 2, columns 11 and 12 of Hill. A 10 percent starch solution gives a viscosity from 12,550 to 105,000 cps after depolymerization treatment. Hill's depolymerization treatment is limited to an acid treatment employing certain sulfonic acids in the presence of non-porous particles of silica coated with a surfactant. Hill does not teach Applicants' invention.

Likewise, the materials disclosed by Brigand are polymers of a much larger size and higher viscosity than Applicants' depolymerized heteropolysaccharides. Brigand teaches that the polymers should provide gels having a viscosity of 300-800 cps in a 1 percent aqueous solution. Brigand also teaches that the polymers maybe used at a concentration of 0.1 to 4 percent in water. Brigands' gums are used as food gelling agents, not as bulking agents. In contrast, Applicants' teach that the viscosity of a 30 percent solution of the depolymerized heteropolysaccharides should not exceed 50 cps. See page 15, lines 20-21.

The Dartney reference discloses reduced calorie cookies comprising water-soluble polydextrose and a cellulosic bulking agent. In the preferred embodiment, the bulking agent is microcrystalline cellulose. Neither polydextrose nor cellulose is a heteropolysaccharide and the Dartney invention does not read on Applicants' invention.

The Barnett reference discloses water soluble bulking agents comprising modified and unmodified hemicelluloses. Hemicelluloses are not heteropolysaccharides. The Barnett bulking agents are prepared from nonwoody lignocellulosic substrates such as corn bran, alfalfa, hay, and the like. These materials all have pentose, not hexose, polymer backbones. Thus, Applicants' invention does not read on the Barnett reference.

As for the Section 103 rejection, none of the references, either alone or taken together, suggest Applicants' invention. Applicants' selection of a hexose backbone polymer for depolymerization provides the limited scope of food gums

which may be used as a substrate for production of the heteropolysaccharide bulking agent. The food gums substrate is desirable because food gums have a proven record of safety in foods for human consumption and provide functional characteristics in the depolymerized form which have beneficial properties. For example, the grittiness and residual mouthfeel of the cellulosic bulking agents are undesirable. These properties are absent from the bulking agents derived from food gums. Furthermore, Applicants' invention is limited to heteropolysaccharides having a DP of 3 to 75 because these materials are substantially non-digestible. In contrast, mono- or disaccharides or food grade homopolysaccharides such as starch, glucan and some celluloses, upon depolymerization, are substantially digestible and provide caloric content to foods.


As can be seen in the data present in Table III and Table IV and Example 12, pages 24-28, the molecular size and weight of the bulking agents and the amount of depolymerization are critical limitations to the utility of the bulking agents as functional replacements for sugar in foods. For example, Table III shows that depolymerized guar gum having a viscosity in a 30 percent solution of 2,500 cps yields a cake with unacceptable quality. The same guar gum sample also contained 15.9 percent, by weight, of fragments having a weight average molecular weight of more than 10,000. Similar results are shown for depolymerized guar gum used to make puddings. None of the references disclose this relationship between molecular size and weight distribution and functionality of the bulking agent.

The same comment applies to the selection of substrates for depolymerization. Applicants' selection of certain food gums for their functional characteristics is not suggested by disclosures in the art. For example, as noted earlier, Hill teaches a light depolymerization process so as to improve the functional characteristics of the food gums as gums. Hill does not suggest the use of depolymerized gums as bulking agents.

CONCLUSIONS

For the reasons set forth above, Applicants respectfully request that the rejections under Sections 112, 102 and 103 be withdrawn and that an early allowance of Claims 1-8, 11 and 21-28 be granted.

Respectfully submitted,



Mary E. Porter, Reg. No. 33,440
Attorney for Applicants
Tel. No. 908-685-5127

National Starch and Chemical Company
P. O. Box 6500
Bridgewater, New Jersey 08807

May 30, 1991

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D. C. 20231, ON <u>May 30, 1991</u> BY <u>Mary E. Porter</u>
--